

December 2013

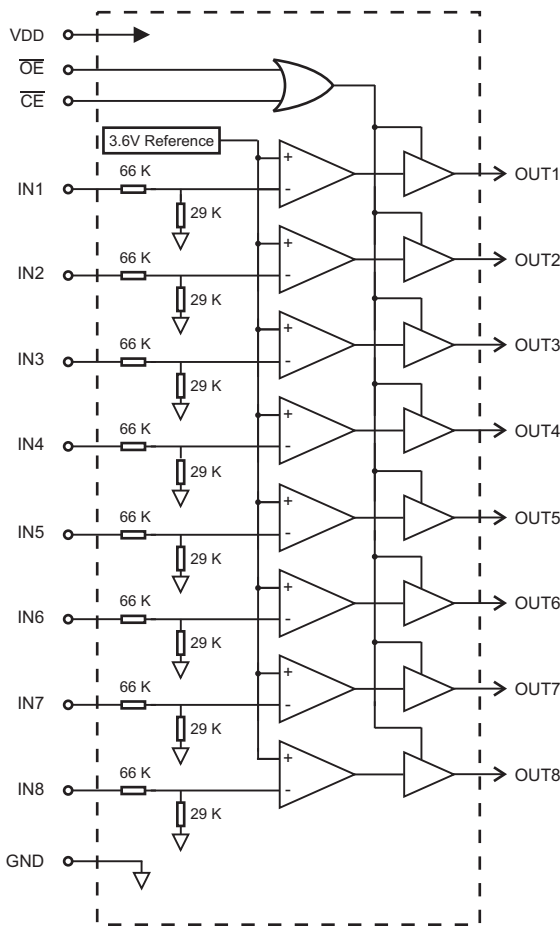
### DESCRIPTION

The HI-8421 is a six channel discrete-to-digital interface device. The HI-8424 has eight channels. Mixed-signal CMOS technology is used to provide superior low-power performance. The device inputs are configured to sense 28V / Open discrete signals. The device outputs are CMOS / TTL compatible and may be disabled (tri-state) using the  $\overline{CE}$  and  $\overline{OE}$  pins.

The HI-8421 is a drop-in replacement for the DE11054.

For added functionality, the Holt HI-8422 offers eight channels of Open / Ground sensing and eight channels of 28V / Ground sensing in a single device.

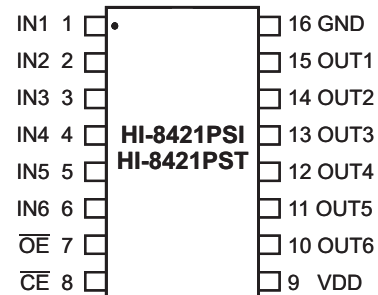
### BLOCK DIAGRAM



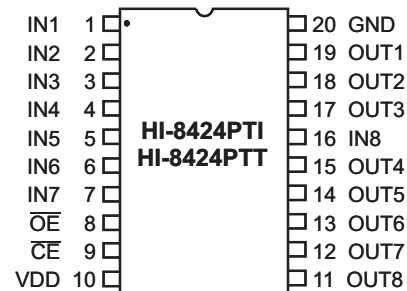
### FEATURES

- 6 or 8 independent 28V / Open sensing channels
- 5.0V single supply operation
- Low power CMOS technology
- Industrial and Extended Temperatures
- HI-8421 is a drop in replacement for DE11054

### PIN CONFIGURATIONS



**16-Pin Plastic SOIC package  
(Narrow Body)**



**20 Pin TSSOP package**

### FUNCTION TABLE

| Discrete Input | $\overline{CE}$ | $\overline{OE}$ | Output |
|----------------|-----------------|-----------------|--------|
| Open           | 0               | 0               | 1      |
| 28 Volts       | 0               | 0               | 0      |
| X              | 1               | X               | High Z |
| X              | X               | 1               | High Z |

## PIN DESCRIPTIONS

| PIN       |           | SYMBOL          | FUNCTION         | DESCRIPTION  |
|-----------|-----------|-----------------|------------------|--|
| (HI-8421) | (HI-8424) |                 |                  |  |
| 1         | 1         | IN1             | Discrete Input   | 28 Volt / Open sensing input, channel 1                                |
| 2         | 2         | IN2             | Discrete Input   | 28 Volt / Open sensing input, channel 2                                |
| 3         | 3         | IN3             | Discrete Input   | 28 Volt / Open sensing input, channel 3                                |
| 4         | 4         | IN4             | Discrete Input   | 28 Volt / Open sensing input, channel 4                                |
| 5         | 5         | IN5             | Discrete Input   | 28 Volt / Open sensing input, channel 5                                |
| 6         | 6         | IN6             | Discrete Input   | 28 Volt / Open sensing input, channel 6                                |
| -         | 7         | IN7             | Discrete Input   | 28 Volt / Open sensing input channel 7                                 |
| 7         | 8         | $\overline{OE}$ | Digital input    | Output Enable. OUT1-OUT8 are high-impedance if $\overline{OE}$ is high |
| 8         | 9         | $\overline{CE}$ | Digital input    | Chip Enable. OUT1-OUT8 are high-impedance if $\overline{CE}$ is high   |
| 9         | 10        | VDD             | Power            | Positive supply voltage 5.0 V  |
| -         | 11        | OUT8            | Tri-state output | Logic output, channel 8  |
| -         | 12        | OUT7            | Tri-state output | Logic output, channel 7  |
| 10        | 13        | OUT6            | Tri-state output | Logic output, channel 6  |
| 11        | 14        | OUT5            | Tri-state output | Logic output, channel 5  |
| 12        | 15        | OUT4            | Tri-state output | Logic output, channel 4  |
| -         | 16        | IN8             | Discrete Input   | 28 Volt / Open sensing input, channel 8                                |
| 13        | 17        | OUT3            | Tri-state output | Logic output, channel 3  |
| 14        | 18        | OUT2            | Tri-state output | Logic output, channel 2  |
| 15        | 19        | OUT1            | Tri-state output | Logic output, channel 1  |
| 16        | 20        | GND             | Power            | Ground   |

## ABSOLUTE MAXIMUM RATINGS

|                              |                  |
|------------------------------|------------------|
| Supply voltage (VDD)         | -0.3 V to +7 V   |
| Logic input voltage range    | -0.3 V to +5.5 V |
| Discrete input voltage range | -80 V to + 80 V  |
| Power dissipation at 25°C    | 350 mW           |
| Solder temperature (reflow)  | 260°C            |
| Storage temperature          | -65°C to +150°C  |

## RECOMMENDED OPERATING CONDITIONS

|                             |                 |
|-----------------------------|-----------------|
| Supply Voltage              |                 |
| VDD .....                   | 4.5 V to 5.5 V  |
| Operating Temperature Range |                 |
| Industrial Screening .....  | -40°C to +85°C  |
| Hi-Temp Screening .....     | -55°C to +125°C |

NOTE: Stresses above absolute maximum ratings or outside recommended operating conditions may cause permanent damage to the device. These are stress ratings only. Operation at the limits is not recommended.

## ELECTRICAL CHARACTERISTICS

VDD = 5.0V ± 10%, GND = 0V, TA = Operating Temperature Range (unless otherwise specified).

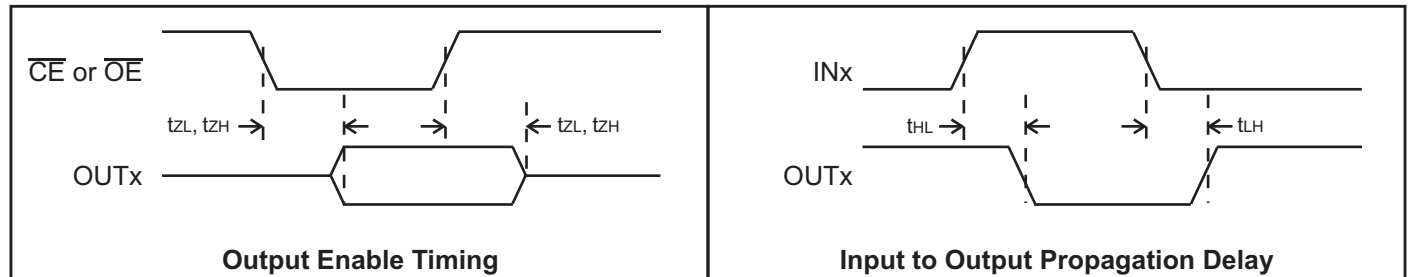
| PARAMETER                | SYMBOL            | CONDITION                                 | MIN | TYP | MAX | UNITS |
|--------------------------|-------------------|---|-----|-----|-----|-------|
| DISCRETE INPUTS          |                   |   |     |     |     |       |
| Open state input voltage | V <sub>SO</sub>   | Input voltage to give high output         | -5  |     | 10  | V     |
| 28 V state input voltage | V <sub>S28</sub>  | Input voltage to give low output          | 14  |     |     | V     |
| Open state input current | I <sub>SO</sub>   | Maximum input current to give high output |     |     | 84  | µA    |
| 28 V state input current | I <sub>S28</sub>  | Minimum input current to give low output  | 197 |     |     | µA    |
| Input resistance         | R <sub>IN</sub>   | 0 V < V <sub>IN</sub> < 16 V              | 71  |     | 119 | KΩ    |
| Input current at 28 V    | I <sub>IN28</sub> | V <sub>IN</sub> = 28 V                    |     |     | 394 | µA    |

## ELECTRICAL CHARACTERISTICS (Cont.)

VDD = 5.0V ± 10%, GND = 0V, TA = Operating Temperature Range (unless otherwise specified).

| PARAMETER  | SYMBOL           | CONDITION        | MIN                                     | TYP            | MAX | UNITS   |    |
|--|------------------|------------------|---|----------------|-----|---------|----|
| LOGIC INPUTS ( $\overline{CE}$ , $\overline{OE}$ ) |                  |                  |   |                |     |         |    |
| Input Voltage                                      | Input voltage HI | $V_{IH}$         | 2.0                                     |                |     | V       |    |
|  | Input voltage LO | $V_{IL}$         |   |                | 0.8 | V       |    |
| Input current                                      | Input sink       | $I_{IH}$         | $V_{IH} = V_{DD}$                       |                | 1.0 | $\mu A$ |    |
|  | Input source     | $I_{IL}$         | $V_{IL} = 0 V$                          | -1.0           |     | $\mu A$ |    |
| OUTPUTS  |                  |                  |   |                |     |         |    |
| Logic output voltage                               | High             | $V_{OH}$         | $I_{OH} = -5 mA$                        | 2.4            |     | V       |    |
|  | Low              | $V_{OL}$         | $I_{OL} = 5 mA$                         |                | 0.4 | V       |    |
| Logic output voltage (CMOS)                        | High             | $V_{OH}$         | $I_{OH} = -100 \mu A$                   | $V_{DD} - 0.2$ |     | V       |    |
|  | Low              | $V_{OL}$         | $I_{OL} = 100 \mu A$                    |                | 0.2 | V       |    |
| Tri-state output current                           |                  | $I_{OZ}$         | $V_{OUT} = 0 V$ or $V_{DD}$             |                | ±10 | $\mu A$ |    |
| SUPPLY CURRENT                                     |                  |                  |   |                |     |         |    |
| VDD current  |                  | $I_{DD}$         | $V_{IN} = 0 V$ (all inputs)             |                | 5   | 10      | mA |
| SWITCHING CHARACTERISTICS                          |                  |                  |   |                |     |         |    |
| Propagation delay                                  | IN to OUT        | $t_{LH}, t_{HL}$ |   |                | 500 | ns      |    |
| Output enable time                                 |                  | $t_{ZL}, t_{ZH}$ | From $\overline{CE}$ or $\overline{OE}$ |                | 25  | ns      |    |
| Output disable time                                |                  | $t_{LZ}, t_{HZ}$ | From $\overline{CE}$ or $\overline{OE}$ |                | 25  | ns      |    |

## TIMING DIAGRAMS



## ORDERING INFORMATION

HI - 842xxx x x

|             |  | LEAD FINISH                              |         |
|-------------|--|--|---------|
| Blank       |  | Tin / Lead (Sn / Pb) Solder              |         |
| F           |  | 100% Matte Tin (Pb-free, RoHS compliant) |         |
| PART NUMBER | TEMPERATURE RANGE                      | FLOW                                     | BURN IN |
| I           | -40°C TO +85°C                         | I  | NO      |
| T           | -55°C TO +125°C                        | T  | NO      |
| PART NUMBER | PACKAGE DESCRIPTION                    |  |         |
| 8421PS      | 16 PIN PLASTIC NARROW BODY SOIC (16HN) |  |         |
| 8424PT      | 20 PIN PLASTIC TSSOP (20HT)            |  |         |

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## REVISION HISTORY

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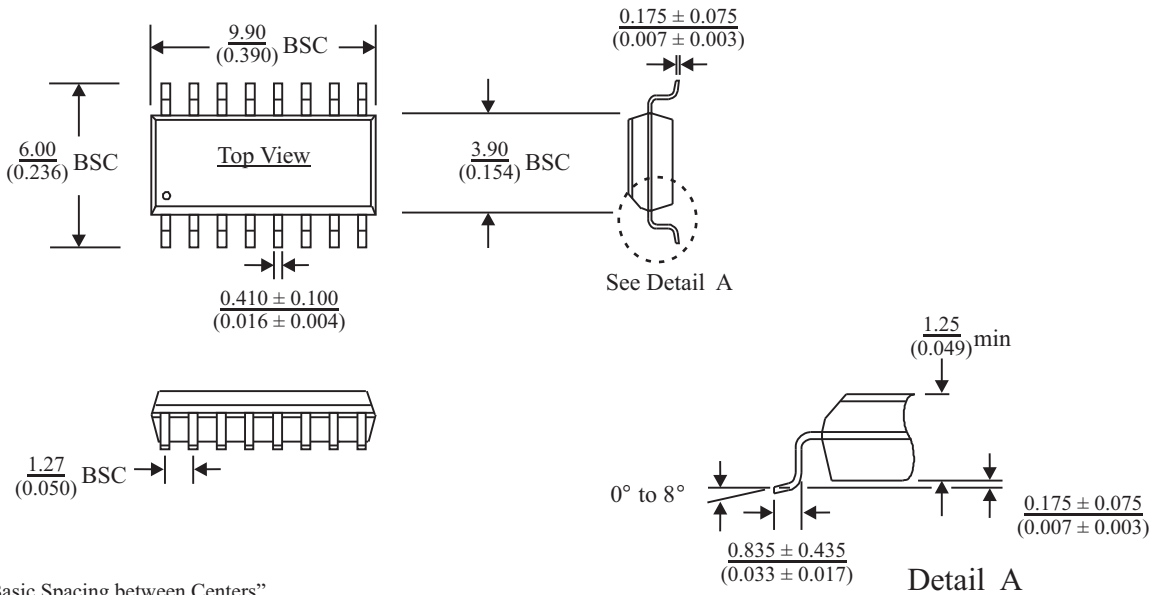
| P/N    | Rev | Date     | Description of Change   |
|--------|-----|----------|---|
| DS8421 | F   | 08/04/10 | Removed reference to lightning protection throughout datasheet and added reference to available temperature ranges. |
|        | G   | 12/10/13 | Update package information. Update solder reflow temperature in Absolute Maximum Ratings table.                     |

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**16-PIN PLASTIC SMALL OUTLINE (SOIC) - NB**  
(Narrow Body)

millimeters (inches)

Package Type: 16HN

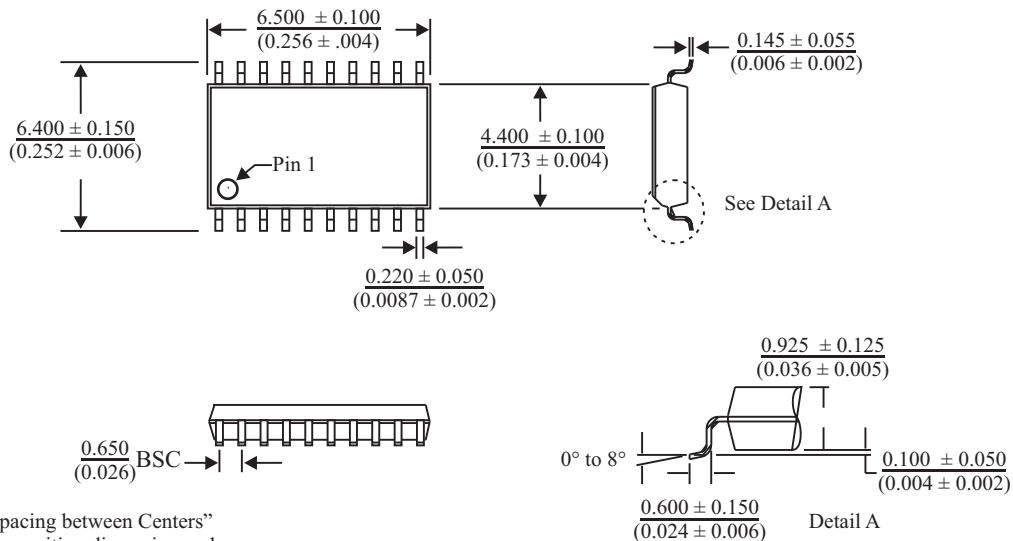


BSC = "Basic Spacing between Centers" is theoretical true position dimension and has no tolerance. (JEDEC Standard 95)

**20-PIN PLASTIC TSSOP**

millimeters(inches)

Package Type: 20HS



BSC = "Basic Spacing between Centers" is theoretical true position dimension and has no tolerance. (JEDEC Standard 95)